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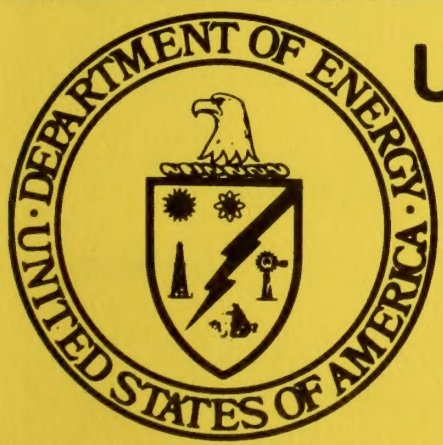
SOLAR/1045-79/04

Monthly Performance Report

MONTECITO PINES

APRIL 1979



U.S. Department of Energy

National Solar Heating and Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

MONTECITO PINES

APRIL 1979

I. SYSTEM DESCRIPTION

The Montecito Pines site is an apartment complex in Santa Rosa, California. It consists of one instrumented unit containing eight apartments. Each apartment has approximately 864 square feet of conditioned space. Solar energy is used for space heating and preheating domestic hot water (DHW). The solar energy system which serves the eight-apartment unit has an array of flat-plate collectors with a gross area of 950 square feet. The array faces 22 degrees west of south at an angle of 45 degrees to the horizontal. Water is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Freeze protection is provided by drain down. Solar energy is stored underground in a 2000-gallon insulated tank. City water is circulated through a heat exchanger in the storage tank for preheating before entering a gas-fired boiler which supplies DHW on demand. When solar energy is insufficient to satisfy the space heating load, the gas-fired boiler provides auxiliary energy for space heating. The system, shown schematically in Figure 1, has four modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the collector plate temperature exceeds the storage temperature by 17°F and terminates when a temperature difference of 3°F is reached. Collector loop pump P1 is operating.

Mode 2 - Storage-to-Space Heating: This mode activates when there is a space heating demand and the temperature at the top of the storage tank is 105°F or higher. Space heating pump P2 is operating and mode diversion valves V1 and V2 divert the flow to the heat exchanger in the storage tank and bypass the gas-fired boiler.

Mode 3 - Auxiliary Space Heating, DHW Preheating: This mode activates when there is a space heating demand and the temperature at the top of the storage tank is less than 105°F. Space heating pump P2 is operating and mode diversion valves V1 and V2 direct the flow through the gas-fired boiler and bypass the heat exchanger in the storage tank.

Mode 4 - DHW Preheating: This mode activates when there is a demand for DHW. Incoming city water passes through the heat exchanger in the storage tank on the way to the gas-fired boiler which supplies hot water, on demand, to the apartments.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied in April and the solar energy system operated continuously during the month. Solar energy satisfied 59 percent of the DHW requirements and 33 percent of the space heating requirements. The solar energy

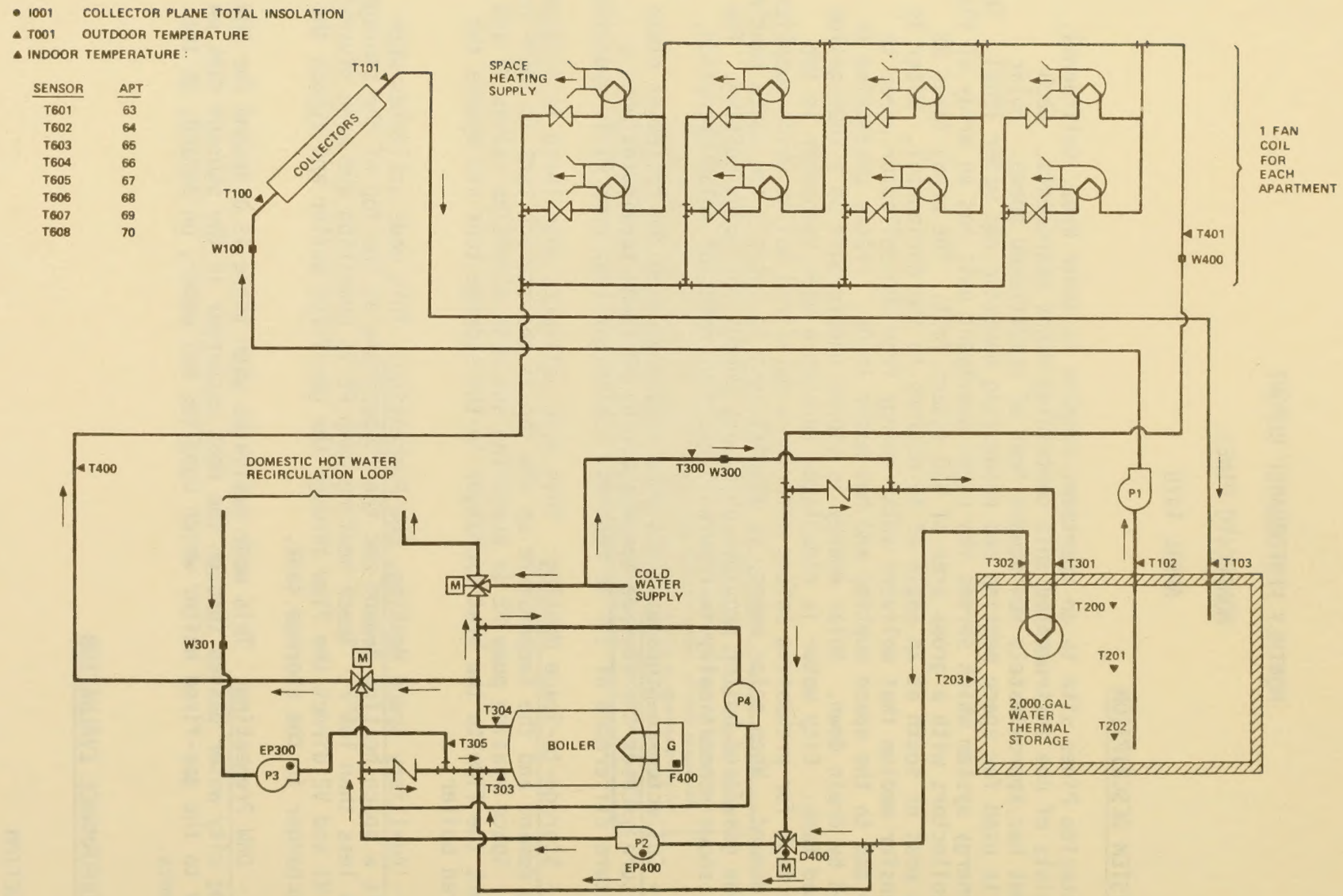

Figure 1. MONTECITO PINES APARTMENTS SOLAR ENERGY SYSTEM SCHEMATIC

system provided a fossil fuel energy savings of 17.4 million Btu at an expense of 0.67 million Btu of electrical energy.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 48.5 million Btu for a daily average of 1703 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during April of 1827 Btu per square foot for a plane facing 22 degrees west of south with a tilt of 45 degrees to the horizontal. The average ambient temperature during April was 53°F as compared with the long-term average for April of 56°F. The number of heating degree-days for the month (based on a 65°F reference) was 360, as compared with the long-term average of 279.

THERMAL PERFORMANCE

System - During April the solar energy system performed somewhat poorer than expected. The expected performance was determined from a modified f-chart analysis using measured weather and subsystem loads as inputs. Solar energy collected was 13.4 million Btu versus an estimated 15.8 million Btu. Solar energy used by the system was estimated by assuming that all energy collected would be applied to the load. Actual solar energy used was 10.4 million Btu. System total solar fraction was 41 percent versus an estimated 50 percent.

Collector - The total incident solar radiation on the collector array for the month of April was 48.5 million Btu. During the period the collector loop was operating, the total insolation amounted to 43.1 million Btu. The total collected solar energy for the month of April was 13.4 million Btu, resulting in a collector array efficiency of 28 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 11.5 million Btu. Energy loss during transfer from the collector array to storage was 1.8 million Btu. This loss represented 14 percent of the energy collected. Operating energy required by the collector loop was 0.66 million Btu.

Storage - Solar energy delivered to storage was 11.5 million Btu. There were 11.5 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 0.08 million Btu. This loss represented 1 percent of the energy delivered to storage. The storage efficiency was 99 percent: This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 108°F.

DHW Load - The DHW subsystem consumed 4.6 million Btu of solar energy and 6.2 million Btu of auxiliary thermal energy (equivalent to 7.7 million Btu of auxiliary fossil fuel energy) to satisfy a hot water load of 7.8 million Btu. The solar fraction of this load was 59 percent. Losses from the DHW subsystem were 3.0 million Btu. The DHW subsystem consumed a total of 0.70 million Btu of operating energy. A daily average of 451 gallons of DHW was consumed at an average temperature of 135°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 5.8 million Btu of solar energy and 15.2 million Btu of auxiliary thermal energy (equivalent to 19.0 million Btu of auxiliary fossil fuel energy) to satisfy a space heating load of 17.8 million Btu. The solar fraction of this load was 33 percent. Losses from the space heating subsystem were 3.3 million Btu. The space heating subsystem consumed a total of 2.1 million Btu of operating energy.

OBSERVATIONS

The extremely low storage loss during April is the result of an exceptional time-phase match between the collection and use of solar energy at this site. Solar energy was collected and delivered to storage during 29 out of 30 days in April; and solar energy was used for space heating for the same time period during 25 days. The system design is such that incoming city water is pre-heated at the same time that hot water is used. There was little time lag between the collection of solar energy and its application to the DHW and space heating loads; consequently, storage losses were minimal.

ENERGY SAVINGS

The solar energy system provided a total fossil fuel energy savings of 17.4 million Btu at an expense of 0.67 million Btu of electrical energy. The DHW subsystem provided a fossil fuel energy savings of 7.7 million Btu. The space heating subsystem contributed a fossil fuel energy savings of 9.7 million Btu.

III. ACTION STATUS

Correction of the identified sensor anomalies has not been scheduled.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: MONTECITO PINES SANTA ROSA, CA SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

SITE/SYSTEM DESCRIPTION:
MONTECITO PINES IS AN APARTMENT COMPLEX WITH EIGHT INSTRUMENTED UNITS. THE SOLAR ENERGY SYSTEM PROVIDES SPACE HEATING AND DOMESTIC HOT WATER. THE COLLECTION STORAGE LOOP USES WATER FOR THE ENERGY TRANSFER AND STORAGE MEDIUM. WATER FOR DOMESTIC HOT WATER USE PASSES THROUGH A HX IN THE STORAGE TANK AND THEN THROUGH A GAS FIRED BOILER IN THE DHW RECIRC. LOOP. WATER FOR SPACE HEATING CIRCULATES THROUGH THE STORAGE TANK HX OR THROUGH THE GAS FIRED BOILER AND IS AVAILABLE TO INDIVIDUAL APARTMENTS ON DEMAND.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	48.526	MILLION BTU
	51080	BTU/SQ.FT.
COLLECTED SOLAR ENERGY	13.353	MILLION BTU
	14056	BTU/SQ.FT.
AVERAGE AMBIENT TEMPERATURE	53	DEGREES F
AVERAGE BUILDING TEMPERATURE	69	DEGREES F
ECSS SOLAR CONVERSION EFFICIENCY	0.22	
ECSS OPERATING ENERGY	0.665	MILLION BTU
TOTAL SYSTEM OPERATING ENERGY	3.472	MILLION BTU
TOTAL ENERGY CONSUMED	43.500	MILLION BTU

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL	
LOAD	7.825	17.804	N.A.	25.629	MILLION BTU
SOLAR FRACTION	59	33	N.A.	41	PERCENT
SOLAR ENERGY USED	4.604	5.845	N.A.	10.448	MILLION BTU
OPERATING ENERGY	0.701	2.105	N.A.	3.472	MILLION BTU
AUX. THERMAL ENERGY	6.182	15.218	N.A.	21.261	MILLION BTU
AUX. ELECTRIC FUEL	N.A.	N.A.	N.A.	N.A.	MILLION BTU
AUX. FOSSIL FUEL	7.728	19.023	N.A.	26.576	MILLION BTU
ELECTRICAL SAVINGS	0.000	0.000	N.A.	-0.665	MILLION BTU
FOSSIL SAVINGS	7.673	9.741	N.A.	17.414	MILLION BTU

SYSTEM PERFORMANCE FACTOR: 0.672

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFOPMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978. SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: MONTECITO PINES SANTA ROSA, CA SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

SITE/SYSTEM DESCRIPTION:
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GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	51.195 GIGA JOULES
	580062 KJ/SQ.M.
COLLECTED SOLAR ENERGY	14.088 GIGA JOULES
	159619 KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	12 DEGREES C
AVERAGE BUILDING TEMPERATURE	21 DEGREES C
ECSS SOLAR CONVERSION EFFICIENCY	0.22
ECSS OPERATING ENERGY	0.702 GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	3.663 GIGA JOULES
TOTAL ENERGY CONSUMED	45.892 GIGA JOULES

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	8.255	18.783	N.A.	27.038 GIGA JOULES
SOLAR FRACTION	59	33	N.A.	41 PERCENT
SOLAR ENERGY USED	4.857	6.166	N.A.	11.023 GIGA JOULES
OPERATING ENERGY	0.739	2.221	N.A.	3.663 GIGA JOULES
AUX. THERMAL ENG	6.522	16.055	N.A.	22.430 GIGA JOULES
AUX. ELECTRIC FUEL	N.A.	N.A.	N.A.	N.A. GIGA JOULES
AUX. FOSSIL FUEL	8.153	20.069	N.A.	28.038 GIGA JOULES
ELECTRICAL SAVINGS	0.000	0.000	N.A.	-0.702 GIGA JOULES
FOSSIL SAVINGS	8.095	10.277	N.A.	18.371 GIGA JOULES

SYSTEM PERFORMANCE FACTOR: 0.672

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REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: MONTECITO PINES SANTA ROSA, CA SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	2.045	53	0.553	N	0.026	N	0.222
2	2.142	53	0.470	O	0.028	O	0.188
3	2.038	54	0.513	T	0.026	T	0.237
4	1.991	54	0.555		0.027		0.263
5	0.983	50	0.361	A	0.013	A	0.346
6	0.807	51	0.111	P	0.011	P	0.138
7	2.058	53	0.514	P	0.027	P	0.207
8	1.608	53	0.443	L	0.025	L	0.241
9	1.985	52	0.417	I	0.026	I	0.195
10	1.903	51	0.424	C	0.023	C	0.208
11	1.529	56	0.289	A	0.021	A	0.157
12	1.977	54	0.421	B	0.026	B	0.187
13	2.181	56	0.574	L	0.028	L	0.230
14	2.396	54	0.453	E	0.031	E	0.170
15	1.893	56	0.541		0.026		0.255
16	0.723	51	0.246		0.009		0.332
17	1.751	49	0.390		0.023		0.215
18	2.145	48	0.515		0.027		0.222
19	2.028	48	0.458		0.027		0.206
20	1.919	51	0.483		0.024		0.220
21	1.485	52	0.392		0.023		0.234
22	0.996	53	0.150		0.014		0.151
23	0.751	50	0.163		0.009		0.217
24	1.820	53	0.411		0.026		0.197
25	1.552	59	0.434		0.022		0.230
26	0.174	55	0.135		0.000		0.744
27	1.465	57	0.147		0.028		0.100
28	1.845	57	0.394		0.026		0.199
29	1.343	54	0.388		0.026		0.329
30	0.995	53	0.143		0.018		0.144
SUM	48.526	-	11.486	N.A.	0.665	N.A.	-
AVG	1.618	53	0.383	N.A.	0.022	N.A.	0.215
NBS ID	Q001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCE

SITE: MONTECITO PINES SANTA ROSA, CA SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	2.045	1.858	0.609	66	0.298
2	2.142	1.991	0.629	66	0.294
3	2.038	1.871	0.586	69	0.288
4	1.991	1.848	0.586	70	0.294
5	0.983	0.810	0.243	57	0.248
6	0.807	0.593	0.199	54	0.247
7	2.058	1.897	0.596	66	0.290
8	1.608	1.455	0.420	62	0.261
9	1.985	1.824	0.536	60	0.270
10	1.903	1.750	0.507	59	0.266
11	1.529	1.365	0.396	64	0.259
12	1.977	1.798	0.544	66	0.275
13	2.181	2.004	0.631	67	0.289
14	2.396	2.256	0.702	*	0.293
15	1.893	1.734	0.561	68	0.296
16	0.723	0.424	0.102	55	0.141
17	1.751	1.550	0.507	56	0.290
18	2.145	1.982	0.606	59	0.282
19	2.028	1.855	0.537	61	0.265
20	1.919	1.716	0.523	66	0.272
21	1.485	1.271	0.412	65	0.277
22	0.996	0.678	0.192	60	0.192
23	0.751	0.524	0.145	55	0.193
24	1.820	1.670	0.584	57	0.321
25	1.552	1.381	0.479	70	0.309
26	0.174	0.000	0.000	54	0.000
27	1.465	1.376	0.397	64	0.271
28	1.845	1.716	0.573	67	0.311
29	1.343	1.188	0.327	66	0.243
30	0.995	0.757	0.224	60	0.226
SUM	48.526	43.143	13.353	-	-
AVG	1.618	1.438	0.445	62	0.275
NBSID	0001		0100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE: MONTECITO PINES SANTA ROSA, CA SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.540	0.553	0.036	112	1.090
2	0.555	0.470	0.030	111	0.901
3	0.516	0.513	0.027	112	1.046
4	0.498	0.555	-0.027	112	1.060
5	0.203	0.361	-0.122	105	1.179
6	0.171	0.111	0.024	103	0.792
7	0.542	0.514	0.065	110	1.069
8	0.346	0.443	-0.062	108	1.101
9	0.475	0.417	-0.005	109	0.866
10	0.449	0.424	0.005	108	0.956
11	0.351	0.289	0.067	108	1.013
12	0.467	0.421	0.009	111	0.923
13	0.534	0.574	0.014	112	1.102
14	0.610	0.453	0.019	110	0.774
15	0.483	0.541	-0.033	112	1.053
16	0.075	0.246	-0.105	103	1.875
17	0.457	0.390	0.027	105	0.913
18	0.536	0.515	0.010	109	0.980
19	0.474	0.458	0.000	108	0.966
20	0.453	0.483	0.002	110	1.071
21	0.358	0.392	-0.010	108	1.066
22	0.157	0.150	0.015	104	1.051
23	0.116	0.163	-0.080	102	0.715
24	0.505	0.411	0.076	106	0.963
25	0.430	0.434	0.024	109	1.065
26	0.000	0.135	-0.124	101	1.000
27	0.320	0.147	0.092	102	0.749
28	0.502	0.394	0.121	110	1.026
29	0.245	0.388	-0.128	107	1.060
30	0.169	0.143	0.002	104	0.857
SUM	11.537	11.486	-0.029	-	-
AVG	0.385	0.383	-0.001	108	0.993
NBS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: MONTECITO PINES — SANTA ROSA, CA — SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	0.290	66	0.192	0.024	0.221	N	0.276	0.000	0.319	61	137	471
2	0.254	59	0.151	0.024	0.174	O	0.217	0.000	0.251	63	138	426
3	0.299	60	0.181	0.024	0.152	T	0.190	0.000	0.302	63	136	513
4	0.290	61	0.178	0.024	0.486		0.607	0.000	0.297	65	136	500
5	0.330	54	0.178	0.023	0.113	A	0.141	0.000	0.297	62	136	556
6	0.199	56	0.111	0.022	0.106	P	0.133	0.000	0.186	63	134	339
7	0.307	54	0.195	0.024	0.185	P	0.231	0.000	0.325	62	136	494
8	0.223	57	0.127	0.024	0.197	L	0.246	0.000	0.212	63	138	370
9	0.201	58	0.116	0.024	0.156	I	0.195	0.000	0.194	63	135	347
10	0.229	57	0.130	0.023	0.164	C	0.205	0.000	0.216	65	135	391
11	0.177	58	0.103	0.024	0.130	A	0.163	0.000	0.171	63	135	295
12	0.191	60	0.115	0.024	0.197	B	0.246	0.000	0.191	66	137	334
13	0.344	54	0.218	0.025	0.230	L	0.287	0.000	0.364	65	137	581
14	0.189	66	0.125	0.024	0.336	E	0.420	0.000	0.208	64	137	322
15	0.168	67	0.112	0.024	0.141		0.176	0.000	0.186	64	139	286
16	0.349	52	0.183	0.023	0.159		0.198	0.000	0.305	65	135	647
17	0.247	55	0.135	0.023	0.176		0.220	0.000	0.226	64	133	445
18	0.296	59	0.174	0.023	0.180		0.225	0.000	0.291	65	133	531
19	0.309	58	0.180	0.023	0.416		0.520	0.000	0.300	63	135	536
20	0.260	59	0.154	0.024	0.402		0.502	0.000	0.257	64	136	438
21	0.259	61	0.157	0.024	0.192		0.241	0.000	0.262	65	135	446
22	0.249	60	0.150	0.022	0.158		0.198	0.000	0.250	63	132	445
23	0.289	56	0.163	0.022	0.144		0.180	0.000	0.271	64	131	533
24	0.324	53	0.171	0.023	0.236		0.296	0.000	0.284	64	135	570
25	0.303	59	0.179	0.024	0.223		0.279	0.000	0.298	65	135	523
26	0.197	54	0.107	0.022	0.120		0.150	0.000	0.179	65	134	349
27	0.278	53	0.147	0.022	0.177		0.221	0.000	0.245	65	133	485
28	0.283	53	0.177	0.023	0.418		0.523	0.000	0.295	64	134	495
29	0.237	64	0.151	0.024	0.114		0.143	0.000	0.252	64	135	423
30	0.253	57	0.143	0.022	0.080		0.101	0.000	0.238	65	133	451
SUM	7.825	-	4.604	0.701	6.182	N.A.	7.728	0.000	7.673	-	-	13541
AVG	0.261	59	0.153	0.023	0.206	N.A.	0.258	0.000	0.256	64	135	451
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: MONTECITO PINES SANTA ROSA, CA SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.501	50	0.262	0.071	0.311	N	0.389	0.000	0.436	68	53
2	0.529	44	0.253	0.071	0.357	O	0.446	0.000	0.421	68	53
3	0.545	58	0.301	0.071	0.389	T	0.486	0.000	0.501	68	54
4	0.534	61	0.345	0.071	0.229		0.287	0.000	0.576	69	54
5	0.561	31	0.162	0.071	0.332	A	0.415	0.000	0.270	68	50
6	0.520	0	0.000	0.069	0.742	P	0.928	0.000	0.000	67	51
7	0.589	39	0.231	0.070	0.490	P	0.613	0.000	0.386	68	53
8	0.467	52	0.259	0.071	0.315	L	0.394	0.000	0.432	68	53
9	0.598	51	0.270	0.071	0.404	I	0.505	0.000	0.451	68	52
10	0.655	40	0.265	0.071	0.543	C	0.678	0.000	0.442	68	51
11	0.349	32	0.137	0.071	0.401	A	0.502	0.000	0.228	69	56
12	0.458	53	0.254	0.071	0.327	B	0.409	0.000	0.424	70	54
13	0.436	61	0.284	0.071	0.221	L	0.277	0.000	0.474	70	56
14	0.567	46	0.284	0.071	0.379	E	0.474	0.000	0.473	69	54
15	0.510	77	0.371	0.071	0.147		0.184	0.000	0.619	71	56
16	0.686	6	0.057	0.070	0.818		1.023	0.000	0.095	70	51
17	0.887	27	0.241	0.070	0.773		0.966	0.000	0.402	69	49
18	0.965	33	0.302	0.071	0.850		1.063	0.000	0.503	69	48
19	0.719	36	0.237	0.070	0.546		0.683	0.000	0.395	69	48
20	0.691	39	0.269	0.070	0.457		0.571	0.000	0.448	69	51
21	0.613	30	0.191	0.070	0.385		0.482	0.000	0.319	69	52
22	0.602	0	0.000	0.069	0.944		1.180	0.000	0.000	70	53
23	0.855	0	0.000	0.067	1.075		1.344	0.000	0.000	70	50
24	0.557	34	0.187	0.070	0.488		0.610	0.000	0.312	71	53
25	0.439	40	0.178	0.070	0.373		0.466	0.000	0.296	72	59
26	0.578	3	0.022	0.069	0.798		0.997	0.000	0.037	72	55
27	0.463	0	0.000	0.069	0.693		0.867	0.000	0.000	71	57
28	0.461	41	0.190	0.070	0.358		0.447	0.000	0.316	71	57
29	0.655	50	0.291	0.070	0.234		0.292	0.000	0.485	71	54
30	0.815	0	0.000	0.069	0.839		1.048	0.000	0.000	70	53
SUM	17.804	-	5.845	2.105	15.218	N.A.	19.023	0.000	9.741	-	-
AVG	0.593	33	0.195	0.070	0.507	N.A.	0.634	0.000	0.325	69	53
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: MONTECITO PINES — SANTA ROSA, CA — SOLAR/1045-79/04
REPORT PERIOD: APRIL,1979

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	2153	N	53	66	N	N	N
2	2254	O	53	66	O	O	O
3	2145	T	54	69	T	T	T
4	2095		54	70			
5	1035	A	50	57	A	A	A
6	849	P	51	54	P	P	P
7	2166	P	53	66	P	P	P
8	1693	L	53	62	L	L	L
9	2090	I	52	60	I	I	I
10	2004	C	51	59	C	C	C
11	1609	A	56	64	A	A	A
12	2081	B	54	66	B	B	B
13	2295	L	56	67	L	L	L
14	2522	E	54	*	E	E	E
15	1993		56	68			
16	761		51	55			
17	1843		49	56			
18	2258		48	59			
19	2135		48	61			
20	2020		51	66			
21	1563		52	65			
22	1048		53	60			
23	790		50	55			
24	1916		53	57			
25	1634		59	70			
26	183		55	54			
27	1542		57	64			
28	1942		57	67			
29	1413		54	66			
30	1047		53	60			
SUM	51080	N.A.	-	-	-	-	-
AVG	1703	N.A.	53	62	N.A.	N.A.	N.A.
NBS ID	Q001		N113			N115	N114

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